CLAIMS

(1, 7, 12, 20)

What is claimed is:

Sub B1

1. An optical resonator comprising at least one optical cavity defined by at least two mirror structures in which $V_r \equiv \frac{\pi w}{\lambda}\bar{n}\sqrt{d_0/L_c}$ is less than about 3.3 where d_0 is a sag of a net mirror profile of the mirror structures and w is a full width at half maximum (FWHM) diameter of the net mirror profile of the mirror structures, $\bar{n}$ is the refractive index of the optical cavity; λ is the wavelength of operation, and L_c is a length of the optical cavity.

2. A resonator as claimed in claim 1, wherein V_r is less than 2.8.

3. A resonator as claimed in claim 1, wherein V_r is less than 1.5.

4. A resonator as claimed in claim 1, wherein in an optical distance between the mirror structures is tunable.

5. A resonator as claimed in claim 1, wherein an optical distance between the mirror structures is tunable by out-of-plane deflection of one of the mirror structures.

6. A resonator as claimed in claim 1, wherein a first one the mirror structures is relatively flat such that d_0 and w are based on the mirror profile of the second mirror structure.

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7. An optical resonator having an optical cavity defined by a first mirror structure comprising a substantially flat surface on which a first dielectric mirror is deposited and a second mirror structure comprising a curved surface on which a second dielectric mirror is deposited, wherein a ratio of the mode $1/e^2$ intensity of a lowest order mode to the full width at half maximum (FWHM) diameter of the curved surface of the second mirror structure is greater than 0.7.

8. A resonator as claimed in claim 7, wherein the ratio is greater than about 1.

9. A resonator as claimed in claim 7, wherein the ratio is greater than about 1.2.

10. A resonator as claimed in claim 7, wherein in an optical distance between the mirror structures is tunable.

11. A resonator as claimed in claim 7, wherein at least one of the mirror structures is formed on an electrostatically deflectable structure.

12. A passive optical resonator comprising at least one optical cavity defined by at least two mirror structures in which at least one of the mirror structures has a mirror profile having a diameter and sag that are selected in combination with a length of the cavity to degrade a stability of transverse modes with mode numbers 4 and greater.

13. A resonator as claimed in claim 12, wherein the length of the optical cavity is less than about 50 micrometers, the sag of the mirror profile is less than about 200 nanometers, and a full width at half maximum diameter of the mirror profile is less than 30 micrometers.

14. A resonator as claimed in claim 12, wherein the length of the optical cavity is less than about 30 micrometers, the sag of the mirror profile is less than about 150 nanometers, and a full width at half maximum diameter of the mirror profile is less than 20 micrometers.

15. A resonator as claimed in claim 12, wherein the length of the optical cavity is less than about 20 micrometers, the sag of the mirror profile is less than about 100 nanometers, and a full width at half maximum diameter of the mirror profile is less than 15 micrometers.

16. A resonator as claimed in claim 12, wherein the sag of the mirror profile is less than about 150 nanometers.

17. A resonator as claimed in claim 12, wherein the sag of the mirror profile is less than about 100 nanometers.

18. A resonator as claimed in claim 12, wherein an optical distance between the mirror structures is tunable.

19. A resonator as claimed in claim 12, wherein an optical distance between the mirror structures is tunable by out-of-plane deflection of one of the mirror structures.

20. An optical resonator comprising at least one optical cavity defined by at least two mirror structures wherein a net profile of the mirror structures is concave in a center region surrounding an optical axis and flat and/or convex in an annular region surrounding the center region, and wherein a diameter of the center regions is selected in response to a mode field diameter of a lowest order mode of the resonator.